

IN THE CLAIMS:

1 - 20. (Canceled).

21. (New) A method for monitoring movable parts of a machine, wherein physical material strains on parts of the machine are measured as at least one measured quantity and wherein actual measured values of measured quantities resulting from transformations of the measured quantities are compared with reference values, the comparison result giving information about either interference freedom or an unexpected event, including a collision.

22. (New) A method for monitoring movable parts of an industrial robot according to claim 21, wherein measured values of at least two different measured quantities are detected and at least one of these measured values is processed to a first measure result in such a way that it is comparable with another measured value of another measured quantity or a second measure result obtained as a result thereof, that the first measure result is compared with another measured value of another measured quantity or the second measure result obtained as a result thereof and that a signal characterizing the comparison result is provided.

23. (New) A method according to claim 21, wherein the material strains are measured by means of at least one transducer.

24. (New) A method according to claim 21, wherein the material strains are measured

by means of a strain gauge.

25. (New) A method according to claim 21, wherein the material strains are measured by means of piezoelectric or light guide-based pickups.

26. (New) A method according to claim 21, wherein the material strains are measured by means of transducers positioned on at least two surfaces of a robot part.

27. (New) A method according to claim 21, wherein actual measured values of measured quantities and/or calculated measure results are compared with reference values, whilst taking account of tolerances.

28. (New) A method according to claim 27, wherein tolerances are taken into account by forming a reference corridor to a reference curve.

29. (New) A method according to claim 21, wherein in the case of divergences from expected measured values and/or calculated measure results, the machine is stopped.

30. (New) A machine with movable parts for an industrial robot, having measured devices for determining physical material strains and a comparison device for comparing actual measured values and/or calculated measure results with predetermined models for robot

movements, the output of the comparison device giving information about either interference freedom or an unexpected event including a collision.

31. (New) A machine according to claim 30, wherein at least two measuring devices are provided for determining material strains and a comparison device for comparing actual measured values and/or calculated measure results with predetermined models for robot movements, the output of the comparison device giving information about an unexpected event including a collision.

32. (New) A machine according to claim 30, wherein the device for determining materials strains are constructed as transducers.

33. (New) A machine according to claim 30, wherein the device for determining material strains are constructed as strain gauges.

34. (New) A machine according to claim 30, wherein the devices for determining material strains are constructed as light guide-based pickups.

35. (New) A machine according to claim 30, wherein in each case at least one device for determining material strains is placed on at least two surfaces of a robot part.

36. (New) A machine according to claim 30, characterized by a monitoring device to which is connected at least one device for determining material strains on machine parts.

37. (New) A machine according to claim 35, wherein the monitoring device has units for monitoring at least elongations of the machine structure and a further measured quantity.

38. (New) A machine according to claim 37, wherein the monitoring device has a device for disconnecting the machine.

39. (New) A method according to claim 21, wherein in the case of divergences from expected measured values and/or calculated measure results, the machine is brought into a safe state.

40. (New) A method according to claim 27, wherein reference values or a reference corridor to a reference curve is generated by calculation using a mathematical model or by recording real measure values under known conditions without any interfering influences.